



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/028,305	12/28/2001	Gee Sung Chae	2658-0283P	2901

2292 7590 06/12/2006

BIRCH STEWART KOLASCH & BIRCH
PO BOX 747
FALLS CHURCH, VA 22040-0747

EXAMINER

RUDE, TIMOTHY L

ART UNIT	PAPER NUMBER
----------	--------------

2883

DATE MAILED: 06/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

H.A

Office Action Summary

Application No.

10/028,305

Applicant(s)

SUNG CHAE ET AL.

Examiner

Timothy L. Rude

Art Unit

2883

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 April 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15, 21 and 22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15, 21 and 22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claims

1. Claims 1, 8, and 21 are amended. Claim 22 is added.

Claim Objections

2. Objections to claims 1, 8, and 21 are withdrawn.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

Art Unit: 2883

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1, 8, 21, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ueda et al (Ueda) USPAT 6,078,365 in view of Hibino et al (Hibino) 6,529,251 B2.

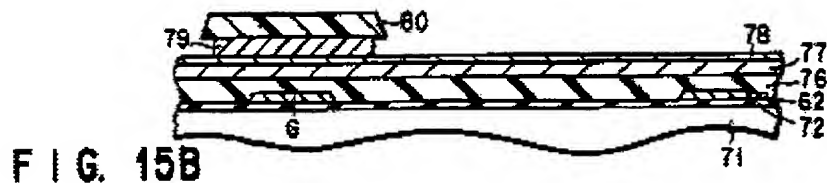
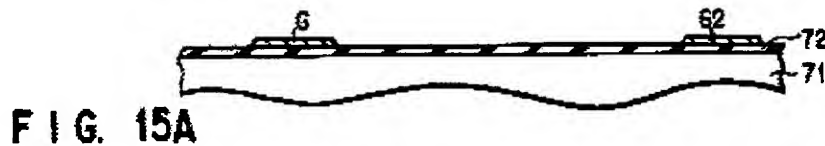
As to claims 1, 8, 21, and 22, Ueda discloses an embodiment in Figures 15A-15F (col. 12, line 58, through col. 18, line 33, especially col. 16, line 64, through col. 18, line 33) comprising: a substrate, 71; a gate electrode, G, over the substrate; a first semiconductor layer, 77, over the gate electrode; a second semiconductor layer, 78, over the first semiconductor layer and having a defined outer edge, source, S, and drain, D, electrodes (Applicant's first metal layer) on the second semiconductor layer, the first metal layer patterned in a same pattern as the second semiconductor layer such that the first metal layer and second semiconductor layer define the channel (Applicant's separation region). Please note that this is by way of only one photolithography pattern per Figures (Applicant's patterned in the same pattern).

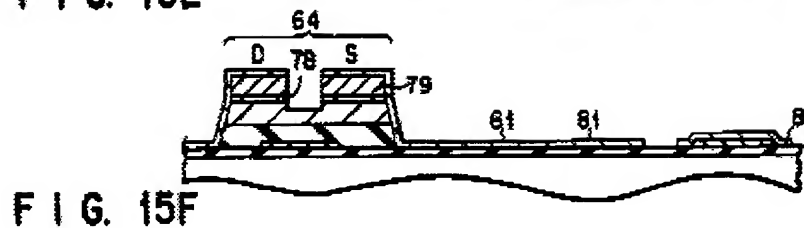
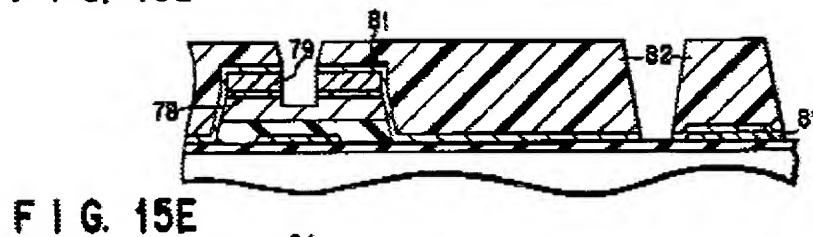
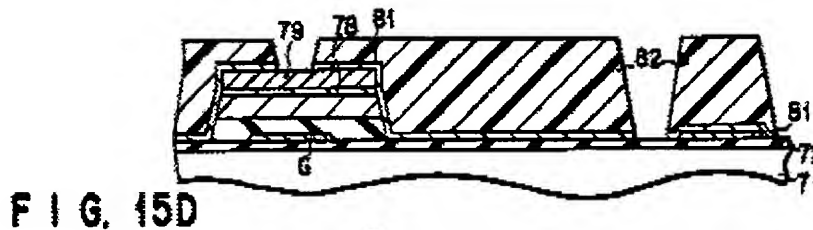
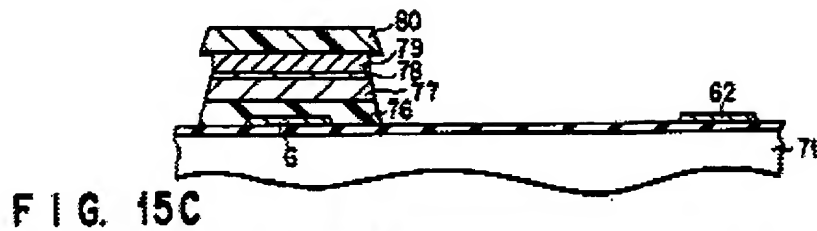
Ueda further discloses the use of source, S, and drain, D, comprised of Aluminum and Molybdenum disposed on Molybdenum (Mo/Al/Mo) (comprises Applicant's electrodes over the first metal layer), the source and drain electrodes patterned the same as the first metal layer and having a defined outer edge and the second semiconductor layer (col. 17, lines 22-42) define first upper portion of the

Art Unit: 2883

separation region, and the source and drain electrodes include a second (Al) and a third (Mo) metal layer, in order to use a low resistance metal such as Aluminum for improved conductivity of the circuit components (col. 17, line 55, through col. 18, line 5).

The outer defined edges of the metal layers and silicon layers are all lined up and abut each other to define the channel as illustrated.





As to method claims 8 and 21, Ueda discloses (col. 12, line 58, through col. 18, line 33, especially col. 16, line 64, through col. 18, line 33) the method of forming a liquid crystal display device, comprising: forming a gate electrode on a substrate; forming an active layer over the gate electrode; forming a first semiconductor layer over the active layer; forming a second semiconductor layer over the first semiconductor layer; forming a first metal layer over the second semiconductor layer patterning the first metal layer and the second semiconductor layer in a same pattern; and forming a source electrode and a drain electrode over the first metal layer.

The outer defined edges of the metal layers and silicon layers are all lined up and abut each other to define the channel as illustrated.

Ueda does not explicitly disclose the newly added limitations as to wet etching followed by dry etching.

Hibino teaches the use of a method including the steps of wet etching followed by dry etching [col. 13, lines 28-65] to reduce defects [col. 4, lines 21-30] and improve uniformity of TFT properties [col. 14, lines 1-10].

Hibino is evidence that workers of ordinary skill in the art would find the reason, suggestion, or motivation to add the steps of wet etching followed by dry etching to reduce defects and improve uniformity of TFT properties.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention of Ueda with the steps of wet etching followed by dry etching of Hibino to reduce defects and improve uniformity of TFT properties.

4. Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art (APA) in view of Ueda and further in view of Hibino.

As to claim 1, APA discloses a conventional liquid crystal display device in Figures 1-5 (Specification pages 1-5), comprising: a substrate, 1; a gate electrode, 3,

Art Unit: 2883

over the substrate; a first semiconductor layer, 15, over the gate electrode; a second semiconductor layer, 17, over the first semiconductor layer, source, 5, and drain, 7, electrodes (Applicant's first metal layer) on the second semiconductor layer, the first metal layer patterned in a same pattern as the second semiconductor layer such that the first metal layer and second semiconductor layer define the channel, 30 (Applicant's separation region) per Figure 3C (specification page 3, lines 28-31). Please note that this is well known in the art to take only one photolithography pattern (Applicant's patterned in the same pattern).

APA does not explicitly disclose (1) source and drain electrodes over the first metal layer, the source and drain electrodes patterned the same as the first metal layer and the second semiconductor layer define first upper portion of the separation region, and the source and drain electrodes include a second and a third metal layer, and (2) wet etching followed by dry etching.

Ueda teaches (1) an embodiment in Figures 15A-15F (col. 12, line 58, through col. 18, line 33, especially col. 16, line 64, through col. 18, line 33) the use of source, S, and drain, D, comprised of Aluminum and Molybdenum disposed on Molybdenum (Mo/Al/Mo) (comprises Applicant's electrodes over the first metal layer), the source and drain electrodes patterned the same as the first metal layer and the second semiconductor layer (col. 17, lines 22-42) define first upper portion of the separation region, and the source and drain electrodes include a second (Al) and a third (Mo) metal layer, in order to use a low resistance metal such as Aluminum for improved conductivity of the circuit components (col. 17, line 55, through col. 18, line 5).

Ueda is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add source and drain electrodes over the first metal layer, the source and drain electrodes patterned the same as the first metal layer and the second semiconductor layer define first upper portion of the separation region, and the source and drain electrodes include a second and a third metal layer in order to use a low resistance metal such as Aluminum for improved conductivity of the circuit components.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of APA with added source and drain electrodes over the first metal layer, the source and drain electrodes patterned the same as the first metal layer and the second semiconductor layer define first upper portion of the separation region, and the source and drain electrodes include a second and a third metal layer in order to use a low resistance metal such as Aluminum for improved conductivity of the circuit components.

Hibino teaches (2) the use of a method including the steps of wet etching followed by dry etching [col. 13, lines 28-65] to reduce defects [col. 4, lines 21-30] and improve uniformity of TFT properties [col. 14, lines 1-10].

Hibino is evidence that workers of ordinary skill in the art would find the reason, suggestion, or motivation to add the steps of wet etching followed by dry etching to reduce defects and improve uniformity of TFT properties.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention of APA in view of Ueda with the

Art Unit: 2883

steps of wet etching followed by dry etching of Hibino to reduce defects and improve uniformity of TFT properties.

As to claim 8, the method of forming a liquid crystal display device, comprising: forming a gate electrode on a substrate; forming an active layer over the gate electrode; forming a first semiconductor layer over the active layer; forming a second semiconductor layer over the first semiconductor layer; forming a first metal layer over the second semiconductor layer patterning the first metal layer and the second semiconductor layer in a same pattern; and forming a source electrode and a drain electrode over the first metal layer, would have been obvious given the device structure above and the teachings of Ueda (col. 12, line 58, through col. 18, line 33, especially col. 16, line 64, through col. 18, line 33) and Hibino (col. 13, lines 28-65; col. 4, lines 21-30; and col. 14, lines 1-10).

As to claim 2, APA discloses a device, further comprising: an insulating layer in between the gate electrode and the first semiconductor layer; a protective layer, 21, over the source and drain electrodes and defining a second upper portion of the separation region (Figure 3D) and a contact hole, 19b, exposing a portion of the drain electrode; and a pixel electrode, 23, in the contact hole (Figure 3E).

As to claim 3, APA in view of Ueda and Hibino, as combined above, discloses the device of claim 1 above, wherein; the second metal layer includes aluminum (Al, Ueda, col. 17, lines 22-30).

As to claim 4, APA in view of Ueda and Hibino, as combined above, discloses the device of claim 1 above, wherein the first and third metal layers are formed of the same material (Mo, Ueda, col. 17, lines 22-30).

As to claim 5, APA in view of Ueda and Hibino, as combined above, discloses the device of claim 1 above.

The device of claim 1 above does not explicitly disclose a device wherein the first and third metal layers are formed of different materials.

Ueda teaches the use of a refractory metal of Cr or a Mo-Ta alloy (col. 12, lines 62-67) as art recognized equivalents suitable for the intended purpose of forming an undercoat conductive layer (MPEP 2144.07).

Ueda is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to use Cr or a Mo-Ta alloy for one of the first or third metal layers, resulting in the claimed device wherein the first and third metal layers are formed of different materials.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of APA in view of Ueda with the Cr or a Mo-Ta alloy for one of the first or third metal layers, resulting in

the claimed device wherein the first and third metal layers are formed of different materials.

As to claim 6, APA in view of Ueda and Hibino, as combined above, discloses the device of claim 1 above, wherein the first and third metal layers include molybdenum (Mo, Ueda, col. 17, lines 22-30).

As to claim 7, APA in view of Ueda and Hibino, as combined above, discloses the device of claim 4 above, wherein the first and third metal layers are formed include molybdenum (Mo, Ueda, col. 17, lines 22-30).

As to claim 9, the method of claim 8, wherein forming the source and drain electrodes includes forming a second metal layer over the first metal layer, forming a third metal layer over the first metal layer, and patterning the second and third metal layers in the same pattern as the first metal layer and second semiconductor layer in the channel region so that a channel portion of the first semiconductor layer is exposed, would have been obvious given the device structure above.

As to claim 10, APA in view of Ueda and Hibino, as combined above, discloses the method of claim 8 above, wherein the first and third metal layers include molybdenum (Mo, Ueda, col. 17, lines 22-30).

As to claim 11, APA in view of Ueda and Hibino, as combined above, discloses the method of claim 9 above, wherein the first and third metal layers are formed of the same material (Mo, Ueda, col. 17, lines 22-30).

As to claim 12, APA in view of Ueda and Hibino, as combined above, discloses the method of claim 9 above.

The method of claim 9 above does not explicitly disclose a device wherein the first and third metal layers are formed of different materials.

Ueda teaches the use of a refractory metal of Cr or a Mo-Ta alloy (col. 12, lines 62-67) as art recognized equivalents suitable for the intended purpose of forming an undercoat conductive layer (MPEP 2144.07).

Ueda is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to use Cr or a Mo-Ta alloy for one of the first or third metal layers, resulting in the claimed method wherein the first and third metal layers are formed of different materials.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of APA in view of Ueda with the Cr or a Mo-Ta alloy for one of the first or third metal layers, resulting in the claimed method wherein the first and third metal layers are formed of different materials.

Art Unit: 2883

As to claim 13, APA in view of Ueda Hibino, as combined above, discloses the method of claim 9 above, wherein; the second metal layer includes aluminum (Al, Ueda, col. 17, lines 22-30).

As to claim 14, APA in view of Ueda and Hibino, as combined above, discloses the method of claim 9 above, wherein the first and third metal layers include molybdenum (Mo, Ueda, col. 17, lines 22-30).

As to claim 15, APA in view of Ueda and Hibino, as combined above, discloses the method of claim 8 above, wherein the patterning of the first metal layer and second semiconductor layer define channel region includes removing a portion of the first metal layer and second metal layer corresponding to the gate electrode and exposing the first semiconductor layer (Figure 15F, and col. 17, lines 14-67).

Response to Arguments

Applicant's arguments with respect to claims 1-15 and 21-22 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated any new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy L. Rude whose telephone number is (571) 272-2301. The examiner can normally be reached on Mon-Thurs.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

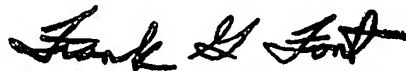
Art Unit: 2883

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



tlr

Timothy L Rude
Examiner
Art Unit 2883



Frank G. Font
Supervisory Patent Examiner
Technology Center 2800